

Page 24, lines 15-18, delete current paragraph and insert therefor:

**Fig. 32** shows AFM pictures of a single assay set comprising electrodes bridged by gold particles (right top) or non bridged by gold particles (left top) and corresponding current voltage curves (right bottom and left bottom, respectively).

Page 24, lines 19-20, delete current paragraph and insert therefor:

**Fig. 33** shows an electronic detection device having a multiplexing array.

Page 24, lines 21-22, delete current paragraph and insert therefor:

**Fig. 34** shows schematically a multiplex array of an electronic detection device

wherein each hybridization site comprises a plurality of detection sites.

Page 24, lines 23-24, delete current paragraph and insert therefor:

**Fig. 35** shows a microelectronic embodiment of multiplex DNA array of Fig. 33.

Page 24, lines 25-26, delete current paragraph and insert therefor:

**Fig. 36** shows a detailed view of cross section in plane A of Fig. 35.

IN THE CLAIMS:

Please replace claims 1-3, 5, 7, 9-11, 24-28, 31-35 and 37-39 as follows:

1. (Amended) A system for assaying one or more targets in a sample,

comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, onto a substrate between the at least two electrodes or to said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets;

(b) an electric or electronic module for determining electric conductance between the at least two electrodes of each assay set; and

*SUB*  
*DM*

(c) reagents for growing a conducting substance from nucleation center-forming entities deposited onto or bound to a complex formed between said recognition moiety and said target, which substance forms a conductive bridge between at least two of the electrodes of a set.

*DM*

2. (Amended) A system according to Claim 1, wherein said reagents comprise:

- (i) a solution comprising nucleation-center forming entities for binding to said target if present in the sample; and
- (ii) a combination of metal ions and a reducing agent to allow growth of said metal substance on said entities.

*DM*

3. (Amended) A system according to Claim 1, wherein said reagents comprise:

- (i) one or more reagents to allow deposition and/or formation of said nucleation center-forming entities on a complex formed between said recognition moiety and said target; and
- (ii) a combination of metal ions and a reducing agent to allow growth of said metal substance from said entities.

*SUB*  
*DM*

5. (Twice Amended) A system according to Claim 2, wherein said

*SUB*  
*DM*

nucleation-center forming entities are metal complexes, clusters or complexes and clusters.

*SUB*  
*DM*

7. (Amended) A system according to Claim 5, wherein said metal complexes or clusters are gold complexes or gold clusters.

*SUB*  
*DM*

9. (Amended) A system according to Claim 5, wherein said metal complexes or clusters are platinum complexes or platinum clusters.

*SUB*  
*DM*

10. (Amended) A system for assaying one or more targets in a sample, comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, immobilized on a substrate between the at least two electrodes or immobilized to said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets;

(b) an electric or electronic module for determining electric conductance between the at least two electrodes of each assay set; and

(c) reagents comprising monomers of a conducting polymer which can bind to a complex formed between said recognition moiety and said target, such that upon polymerization of the monomers a conducting bridge between the at least two electrodes of a set is formed.

11. (Amended) A system according to Claim 10, wherein said monomers are monomers of polyaniline.

24. (Amended) A method for assaying one or more targets in a sample comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes; on a substrate between the at least two electrodes or to said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(c) contacting said device with a first reagent solutions to form nucleation-center forming entities on complexes formed between a target and a recognition moiety;

(d) connecting said device with a second reagent solution to grow a conducting metal substance from said nucleation center for a time sufficient to yield a conductive bridge between said at least two electrodes;

(e) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(f) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

*SuS*  
*Det*  
*3/24/04*

25. (Amended) A method for assaying one or more targets in a sample, comprising:

(a) reacting the sample targets with a first reagent solution to bind nucleation-center forming entities to said targets;

(b) providing an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, on a substrate between the at least two electrodes or to said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets;

(c) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(d) contacting said device with a second reagent solution to grow a conducting metal substance from said nucleation center for a time sufficient to yield a conductive bridge between said at least two electrodes;

(e) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(f) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

26. (Amended) A method for assaying one or more targets in a sample, comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized either to one or more of the at least two electrodes, on a substrate between the at least two electrodes or to said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(c) contacting said device with a first reagent solution comprising monomers of a conductive polymer such that said monomers can bind to complexes formed between the targets and recognition moieties;

(d) treating said device such that said monomers will polymerize to form a conducting polymer, and thereby forming a conducting bridge between at least two electrodes of at least one assay set; and

(e) determining a conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

27. (Amended) A method according to Claim 26, comprising before step (a) reacting the sample with a second reagent solution containing entities which can form nucleation centers for growing therefrom a conductive polymer from said monomers, such that said entities bind to said targets if present in the sample.

28. (Amended) A method according to Claim 26, comprising after step (a):  
contacting said assay device with a second reagent solution containing entities which can  
form nucleation centers for growing therefrom a conductive polymer from said monomers, such  
that said entities bind to said targets if bound to said recognition moieties.

31. (Amended) A kit for use in assaying one or more targets in a sample,  
comprising:

(a) an assay device having one or more assay sets at least one for each target to be  
assayed; each of the assay sets comprising at least two electrodes and a recognition moiety  
immobilized to one or more of the at least two electrodes, onto a substrate between the at least  
two electrodes or to said one or more of the at least two electrodes and onto said substrate; the  
recognition moiety being capable of specific binding to one of the targets; and

(b) reagents for growing a conducting substance from nucleation center-forming  
entities deposited onto or bound to a complex formed between said recognition moiety and  
said target, which substance forms a conductive bridge between at least two of the electrodes  
of a set.

32. (Amended) A kit according to Claim 31, where said reagents comprise:  
(i) a solution comprising nucleation-center forming entities for binding to said  
target if present in the sample; and  
(ii) a combination of metal ions and a reducing agent to allow growth of said metal  
substance on said entities.

33. (Amended) A kit according to Claim 31, where said reagents comprise:  
(i) one or more reagents to allow deposition, formation, or deposition and  
formation of said nucleation-center forming entities on a complex formed between said  
recognition moiety and said target; and

(ii) a combination of metal ions and a reducing agent to allow growth of said metal substance from said entities.

34. (Amended) A kit for use in assaying one or more targets in the sample comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed; each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, onto a substrate between the at least two electrodes or onto said one or more of the at least two electrodes and onto said substrate; the recognition moiety being capable of specific binding to one of the targets; and

(b) reagents comprising monomers of a conducting polymer which can bind to the target or to a complex formed between said recognition moiety and said target, such that upon polymerization of the monomers a conducting bridge between the at least two electrodes of a set is formed.

35. (Amended) An electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of  $N_1$  conductors and a second group of  $N_2$  conductors, defining between them  $N_1 \times N_2$  junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding a target, bound to at least one of the electrodes or to a non-conducting substance disposed between the electrodes, said target after

binding to the recognition moiety forming a nucleation center for growing thereon a conducting substance to form conductance.

37. (Amended) An electric device for determining one or more targets in a sample, comprising

a microelectronic device having a plurality of layers, with a first group of conductors being defined as stripes in one or more first layers and a second group of conductors being defined as stripes in one or more second layers of the device with each of said second layers being separated from a first layer by a non-conducting substance, electrodes of the device being formed as open ends of the conductors by openings or cut-outs in a vertical direction through the layers;

each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding a target bound to at least one of the electrodes or to a non-conducting substance present between the electrodes, said target after binding to the recognition moiety forming a nucleation center for growing thereon a conducting substance to form conductance.

38. (Twice Amended) A system according to Claim 18, wherein the device is an electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of  $N_1$  conductors and a second group of  $N_2$  conductors, defining between them  $N_1 \times N_2$  junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an array set, each